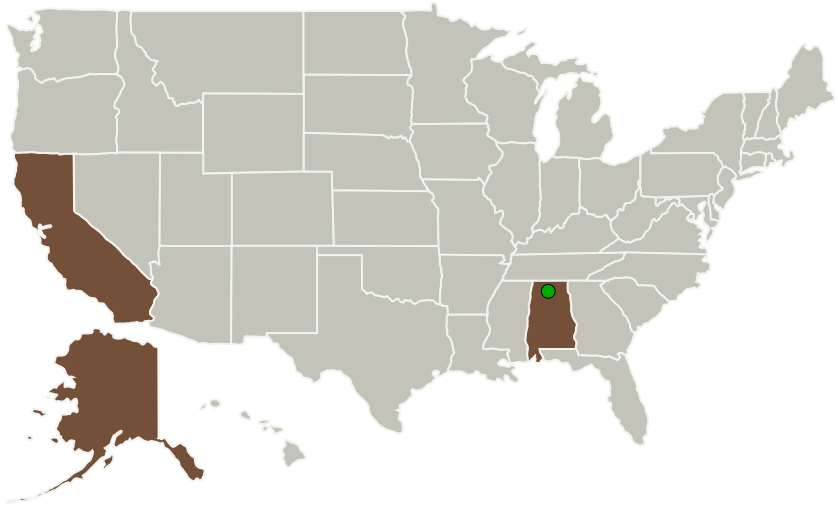
NLV Upper Stage Development and Flight Testing, Phase II

Completed Technology Project (2016 - 2018)

Project Introduction

Our Phase I results include a preliminary design for an advanced nanosat launch vehicle (NLV) upper stage that features several advanced propulsion technologies, as well as extensive empirical data from a series of pathfinding operations conducted at both the Pacific Spaceport Complex - Alaska on Kodiak Island and the Poker Flat Research Range. For Phase II, we are taking major steps, such as building a prototype upper stage, static fire testing it, and conducting another round of pathfinding operations at Kodiak in pursuit of an opportunity to manifest such a prototype stage on a suborbital flight test. Key technologies include LOX/densified propylene propulsion system, liquid rocket engine featuring a 3D additively manufactured injector, pyro-free mechanisms, and use of elements of NASA's Autonomous Flight Termination Unit. Our RI - University of Alaska Fairbanks - will continue to support the evaluation of UAS utilization for range services like telemetry acquisition.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Garvey Spacecraft Corporation	Lead Organization	Industry	Long Beach, California
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama
University of Alaska Fairbanks(UAF)	Supporting Organization	Academia Alaska Native and Native Hawaiian Serving Institutions (ANNH)	Fairbanks, Alaska

Primary U.S. Work Locations	
Alabama	Alaska
California	

Project Transitions

October 2016: Project Start

October 2018: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140808)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Garvey Spacecraft Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Matt Baker

Co-Investigator:

Christopher Bostwick

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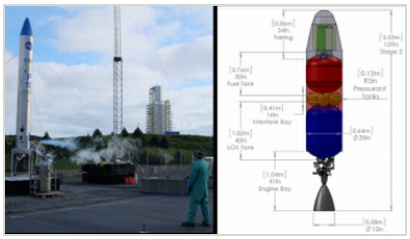
Images

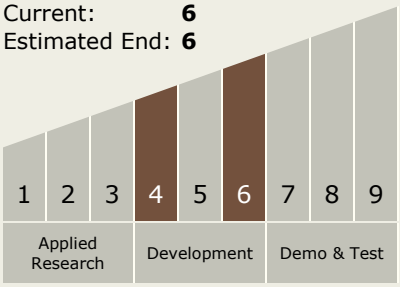


Briefing Chart Image
NLV Upper Stage Development and Flight Testing, Phase II
(https://techport.nasa.gov/image/128445)

Final Summary Chart Image
NLV Upper Stage Development and Flight Testing, Phase II
(https://techport.nasa.gov/image/134814)

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.1 Integrated Systems and Ancillary Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System